CLAIMS

1. A data communications system comprising a plurality of nodes and a plurality of links for providing connections between the nodes;

comprising a subset of the links and nodes for forming a worker path for carrying worker data through the communication system;

in which the system comprises a further subset of links and nodes for forming a plurality of protection paths for carrying non-worker data in the absence of a fault in the worker path and each for providing an alternative path for the worker data in a different part of the worker path in the event of a fault in the worker path;

in which the system comprises protection means, in which the alternative paths are predetermined by the protection means prior to the detection of a fault in the worker path;

in which the protection means is arranged to activate the entire plurality of protection paths to carry the worker data upon detection of a fault in the worker path;

in which the protection means is arranged to identify the location of the fault, to return the worker data to those parts of the worker path not affected by the fault and to de-activate any of the protection paths providing an alternative to those parts of the worker not affected by the fault.

2. The system according to any above claim, in which the nodes of the further subset comprise storage for storing the details of the protection path prior to the detection of a fault in the worker path.

3. The system according to Claim 2 in which the details of the protection path are associated with a unique path identifier.

4. The system according to Claim 2 or 3 in which each of the nodes of the further subset comprise a protection table for storing details of the protection path to which it belongs.

5. The system according to any above claim, in which at least one of the nodes common to both subsets comprises means for detecting a fault in the worker path and means to activate the protection path by sending an activate message to the nodes of the further subset upon detection of the fault in the worker path.

6. The system according to Claim 5 in which in which the nodes comprising means for sending the activate message also comprise means for sending the activate message to each adjacent node of the further subset.

7. The system according to Claim 5 or 6 in which the activate message contains a unique path identifier to inform the nodes of the further subset which connections to activate.

8. The system according to any above claim, in which the nodes comprise means for detecting the location of a fault in the worker path and means for, upon detection of the fault location, sending a deactivate message through the first subset in the direction away from the fault.

9. The system according to Claim 8 in which each node comprises means for detecting receipt of the deactivate message and upon receipt of such a message, to deactivate any path passing from that node via nodes of the further subset where those paths do not form an protection path to the faulty part of the worker path.

10. A method of protecting a worker path in a data communications system comprising a plurality of nodes and a plurality of links for providing connections between the nodes; including the steps of passing worker data through a subset of the links and nodes making up the worker path and designating a further subset of links and nodes to form a plurality of protection paths; in which the protection paths carry no worker data in the absence of a fault in the worker path and in which each provides an alternative path for the worker data in a different part of the worker path in the event of a fault in the worker path;

including the steps of detecting a fault in the worker path and activating the entire plurality of protection paths to carry the worker data upon detection of a fault in the worker path; including the steps of identifying the location of the fault and returning the worker data to those parts of the worker path not affected by the fault and de-activating any of the protection paths that are providing an alternative for those parts of the worker path not affected by the fault.

11. The method according to claim 10 including the step of storing the details of the protection path in the nodes of the further subset prior to the detection of a fault in the worker path.

12. The method according to claim 11 including the step of associating the details of the protection path with a unique path identifier.

13. The method according to claim 11 or 12 in which each of the nodes of the further subset comprise a protection table for storing details of the protection path of which it forms a part.

14. The method according to any of claims 10 to 13 including the steps of at least one of the nodes common to both subsets detecting a fault in the worker path and activating the

protection paths by sending an activate message to the nodes of the further subset upon detection of the fault in the worker path.

15. The method according to claim 14 including the step of the nodes sending the activate message sending it to each adjacent node of the further subset.

16. The method according to any of claims 14 to 15 including the step of including a unique path identifier in the activate message to inform the nodes of the further subset which connections to activate.

17. The method according to any of claims 10 to 16 including the steps of at least one node detecting the location of a fault in the worker path and, upon detection of the fault location, sending a deactivate message through the first subset in the direction away from the fault.

18. The method according to claim 17 including the steps of the nodes detecting receipt of the deactivate message and upon receipt of such a message, deactivating any path passing from that node via nodes of the further subset where those paths do not form a protection path to the faulty part of the worker path.

19. The method according to any of claims 10 to 18 comprising a plurality of nodes and a plurality of links for providing connections between the nodes; including the steps of allocating the links and nodes one or more cost values relative to the links and nodes of the worker path and selecting on the basis of the one or more cost values a further subset of the nodes and links to form a protection path for at least one link or node of the worker path.

20. The method as claimed in claim 19 including the steps of selecting the subset that has the lowest cost value.

21. The method as claimed in claims 19 to 20 including the steps of setting the one or more cost values for nodes and links on the worker path other than the at least one node or link to be protected lower than the cost value for other nodes and links.

22. The method as claimed in claim 21 in which the lower cost value is zero.

23. The method as claimed in claim 19 to 22 including the steps of setting the one or more cost values for the at least one node or link to be protected higher than the cost values for other nodes and links.

24. The method as claimed in claims 19 to 23 including the steps of setting the one or more cost values for the at least one node or link to be protected so that that node or link will not be selected.

25. The method as claimed in claims 19 to 24 in which the data communications system comprises a further worker path and protection for the further worker path.

26. The method as claimed in claim 25 including the steps of setting the one or more cost values relative to the worker path of a node or link to an intermediate value, provided that the nodes and/or links on the worker path and on the further worker path for protection by that node or link have no common point of failure.

27. The method as claimed in claim 26 in which the intermediate value lies between the higher and lower values.

28. The method as claimed in claim 27 including the steps of setting the one or more cost values relative to the worker path of a node or link to a higher value so that node or link

will not be selected, if the nodes and/or links on the worker path and on the further worker path for protection by that node or link have at least one common point of failure.

29. The method as claimed in claims 19 to 28 including the step of allocating each link and node one or more cost values relative to each link and node of the worker path.

30. The method as claimed in claims 19 to 29 including the steps of determining the protection path prior to the detection of a fault in the worker path.

31. The method as claimed in claims 25 to 30 including the steps of allocating the links and nodes a further cost value relative to the further worker path and selecting on the basis of the further cost value a further subset of the nodes and links to form the protection path for at least one link or node of the further worker path.

32. The data communications system of claims 1 to 9 in which the system comprises means for allocating the links and nodes one or more cost values relative to the links and nodes of the worker path and means for selecting on the basis of the one or more cost values a further subset of the nodes and links to form a protection path for at least one link or node of the worker path.

33. The system as claimed in claim 32 comprising means for selecting the subset that has the lowest cost value.

34. The system as claimed in claims 32 to 33 comprising means for allocating nodes or links on the worker path other than the at least one node or link to be protected a cost value lower than the cost value for other nodes and links.

35. The system as claimed in claim 34 in which the lower cost value is zero.

36. The system as claimed in claim 32 to 35 comprising means for allocating the at least one node or link to be protected a cost value higher than the cost value for other nodes and links.

37. The system as claimed in claims 32 to 36 in which a cost value for the node or link to be protected is set so that that node or link will not be selected.

38. The system as claimed in claims 32 to 37 comprising further subsets of the nodes and links for forming both a further worker path and a protection path for the further worker path.

39. The system as claimed in claim 38 comprising means for allocating to a node or link one or more intermediate cost values relative to each link and node of the worker path provided that that link or node in the worker path and the links and nodes in the further worker path protected by the node or link have no common point of failure.

40. The system as claimed in claim 39 in which the intermediate value lies between the higher and lower values.

41. The system as claimed in claim 40 comprising means for allocating to a node or link one or more higher cost values relative to the at least one link or node of the worker path so that that node or link will not be selected where the links and nodes in the worker path and links or nodes in the further worker path protected by the node or link have a common point of failure

42. The system as claimed in claims 32 to 41 including means for allocating the links and nodes a cost value relative to each link and node of the worker path.

43. The system as claimed in claim 32 to 42 in which the system comprises protection means for determining the protection path prior to the detection of a fault in the worker path.

44. The system as claimed in claims 37 to 43 comprising means for allocating the links and nodes a further cost value relative to the further worker path and for selecting on the basis of the further cost value a further subset of the nodes and links to form the protection path for at least one link or node of the further worker path.